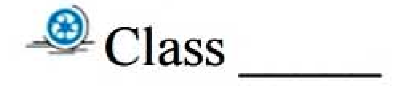
Egyptian Pioneer Schools



Academic year: 2018/ 2019

Preparatory 1
Science – Booklet
Second Term



 Name: ____________________

Class _____

Unit one

Chemical Reactions

Lesson 1: Chemical combination.

Lesson 2: Chemical compounds.

Lesson 3: Chemical equations and reactions.

Lesson 1
Chemical Combination

The atom & the ion:

The number of known elements till now is 118.

Elements can be classified according to their properties and electronic structure into:

(1) Metals | **(2) Non-metals** | **(3) Noble gases**

Comparison between metals and non-metals:

P.O.C	Metals	Non- metals
1. Luster(shining)	They have luster (are shiny).	They don't have luster (not shiny).
2. Conductivity of heat	They are good conductors of heat.	They are bad conductors of heat.
3. Conductivity of electricity	They are good conductors of electricity.	They are bad conductors of electricity.
4. The state at room temperature	They are solids except mercury which is liquid	They are solids, liquids and gases
5. Malleability or hammering	They can be hammered to form sheets.	They can't be hammered.
6. No. of electrons in the outer most energy level	They contain 1, 2 or 3 electrons in their energy shells.	They contain 5, 6 or 7 electrons00 in their energy shells.
7. Examples	Gold- Mercury- Aluminium	Sulphur - Oxygen- Bromine

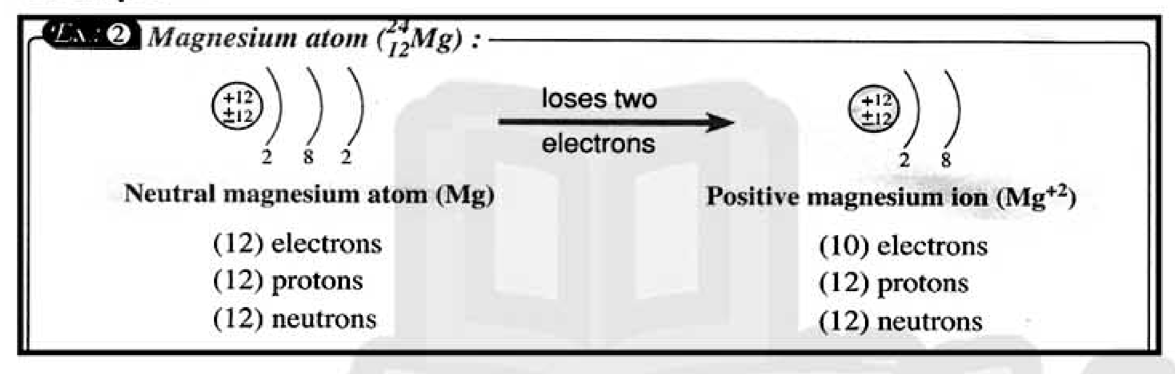
Metals and non-metals in the chemical reactions:

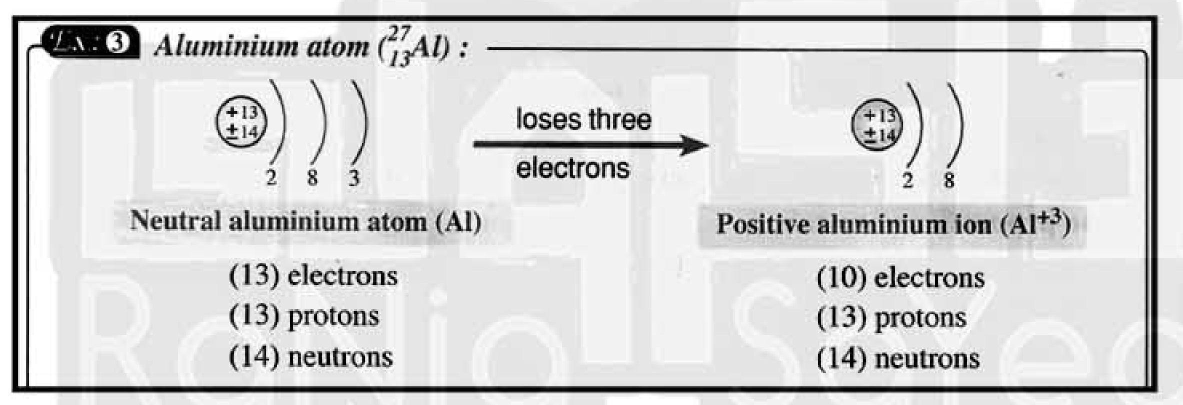
➢ First: Metals

➢**In the chemical reactions:** Atoms of metals lose their outer electrons to other atoms of different elements & change into a ***positive ion*** with equal number of positive charges to the given electrons.

➢***A positive ion:*** is an atom that loses an electron or more during the chemical reaction.

Example:



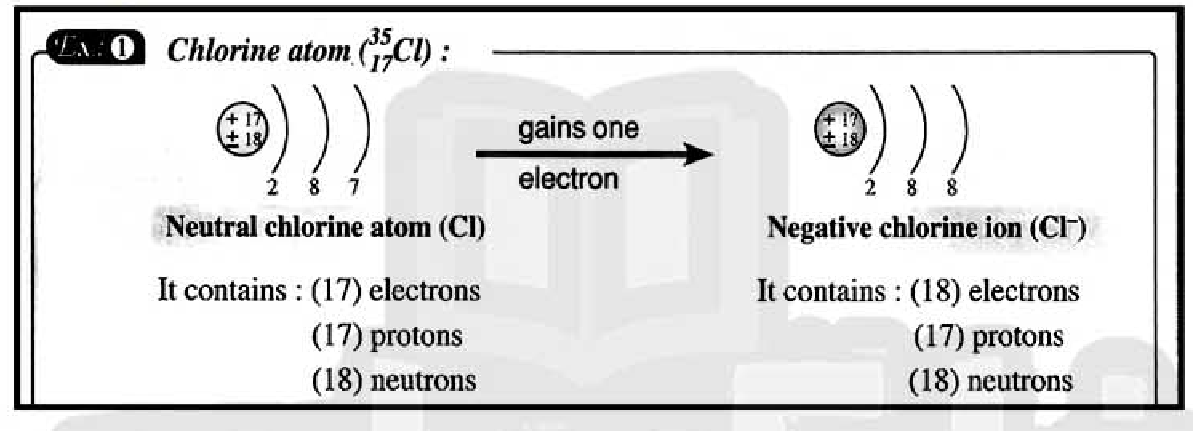


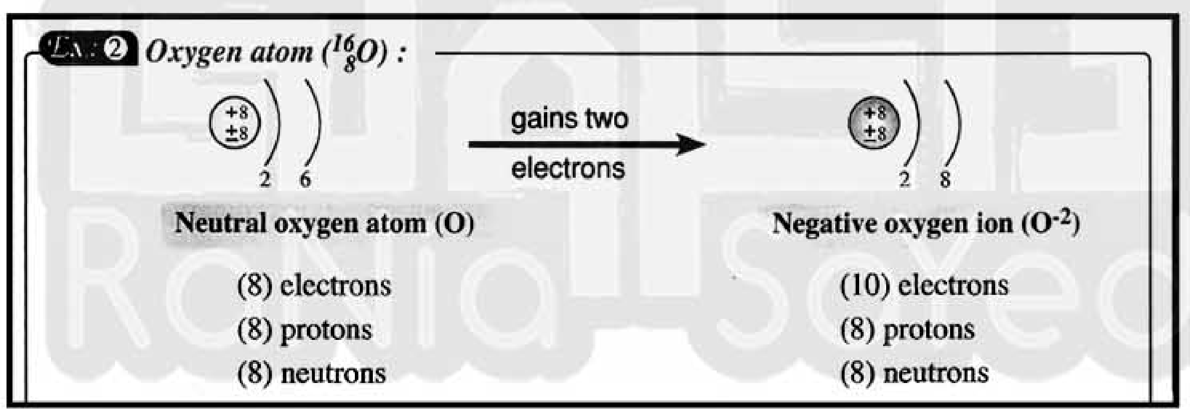
➢ Second: Non-metals

➢ **In the chemical reactions:** Atoms of non-metals gain electrons to fill their outer electron shell & change into a negative ion with equal number of negative charges to the number of electrons gained.

➢ ***A negative ion:*** Is an atom gained an electron or more during the chemical reactions.

Example:





The atom	The ion
- Electrically natural in ordinary state.	- Charged [positive or negative] ions.
- The number of electrons equals the number of protons.	- The number of electrons in more than or less than of protons.

➢ Third: Noble (Inert elements):

(Helium He – Neon Ne – Argon Ar – Krypton Kr – Xenon Xe – Radon Rn)

1. Their outer electron shells are completely filled with electrons. (2 or 8)
2. They don't need a chemical combination with any other atom.
3. They don't form positive or negative ions in the ordinary conditions.

The atom of the inert gas	No. of electrons	No. of protons	No. of neutrons	Electronic configuration
$^{4}_{2}He$	2	2	2	K: 2 (nucleus +2, ±2)
$^{20}_{10}Ne$	10	10	10	K: 2, L: 8 (nucleus +10, ±10)
$^{40}_{18}Ar$	18	18	22	K: 2, L: 8, M: 8 (nucleus +18, ±22)

Types of bonds

1- Ionic bond
Between a metal & a non- metal

2- Covalent bond
Between two non- metals

1-Ionic bond

1- The combination between a metal atom & a non- metal atom.

2- The metal atom gives its outer shell electrons to the non- metal atom.

3- A strong electrical attraction force take place between the positive metal ions & the negative non-metal ions forming an ionic compound molecule.

➢ ***Ionic bond*** :
It is a bond resulting from the electric attraction between a positive ion and a negative ion.

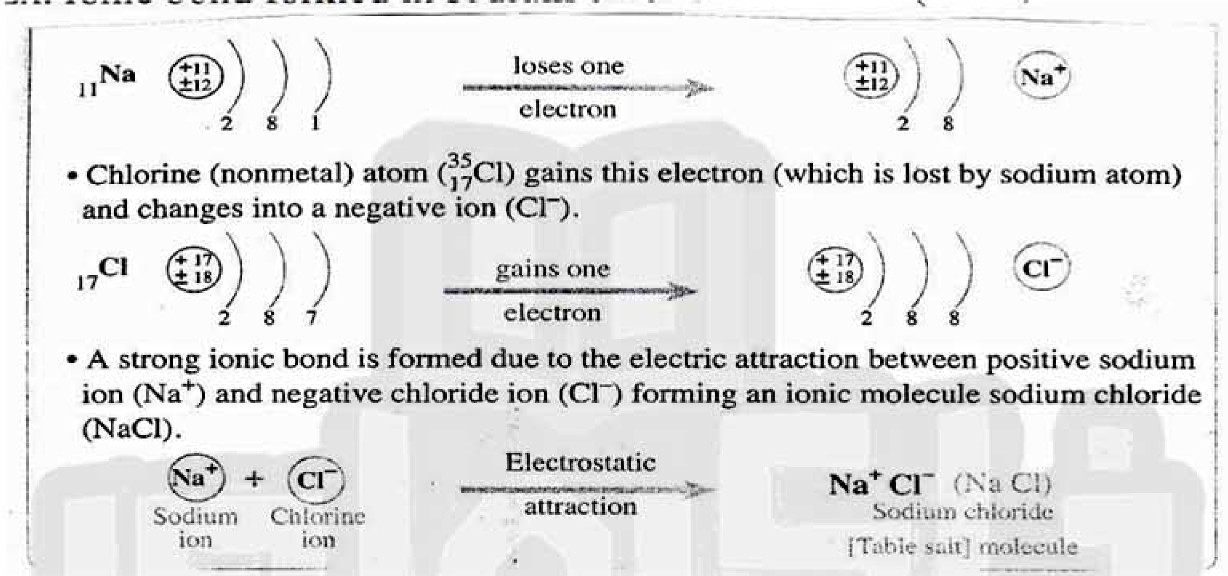
Example

How sodium atom reacts with chlorine atom to form sodium chloride molecule (NaCl):

1- Sodium atom loses an electron from its outermost energy level to be positive ion.

2- Chlorine atom gains an electron from sodium atom to be negative ion.

3- The sodium chloride molecule forms between the sodium positive ion and the chlorine negative ion.



$_{11}Na$ (+11, ±12) 2, 8, 1 — loses one electron → (+11, ±12) 2, 8 Na^+

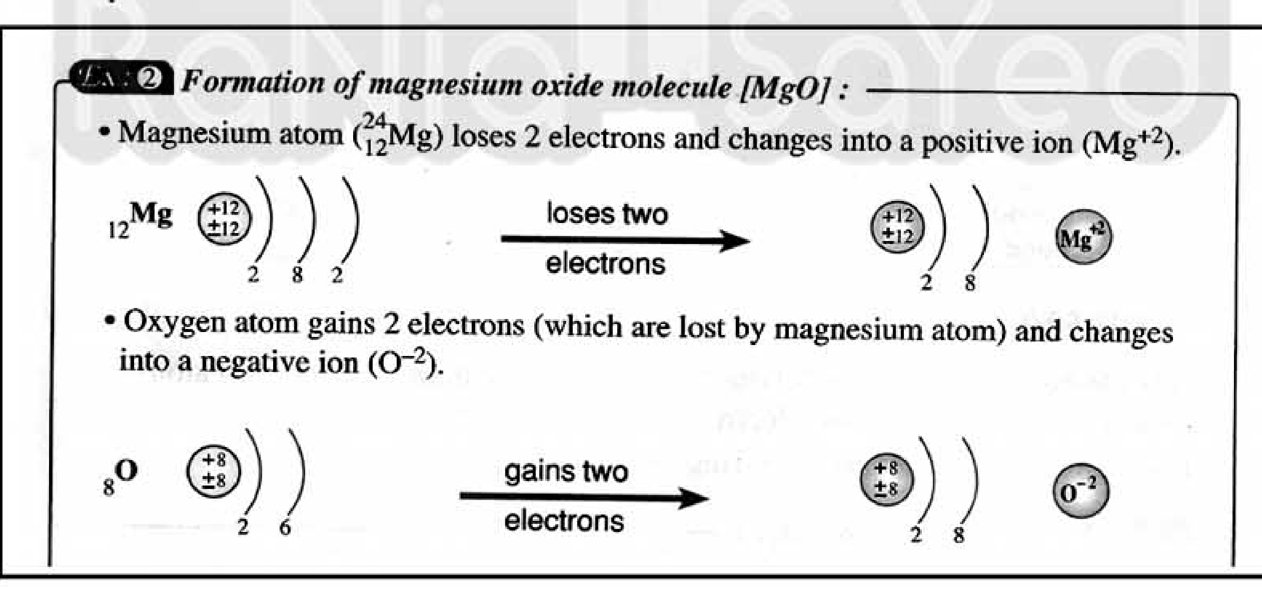
• Chlorine (nonmetal) atom ($^{35}_{17}Cl$) gains this electron (which is lost by sodium atom) and changes into a negative ion (Cl^-).

$_{17}Cl$ (+17, ±18) 2, 8, 7 — gains one electron → (+17, ±18) 2, 8, 8 Cl^-

• A strong ionic bond is formed due to the electric attraction between positive sodium ion (Na^+) and negative chloride ion (Cl^-) forming an ionic molecule sodium chloride (NaCl).

Na^+ (Sodium ion) + Cl^- (Chlorine ion) — Electrostatic attraction → Na^+Cl^- (Na Cl) Sodium chloride [Table salt] molecule

Example2:



Ex. 2 *Formation of magnesium oxide molecule [MgO] :*

• Magnesium atom ($^{24}_{12}Mg$) loses 2 electrons and changes into a positive ion (Mg^{+2}).

$_{12}Mg$ (+12, ±12) 2, 8, 2 — loses two electrons → (+12, ±12) 2, 8 Mg^{+2}

• Oxygen atom gains 2 electrons (which are lost by magnesium atom) and changes into a negative ion (O^{-2}).

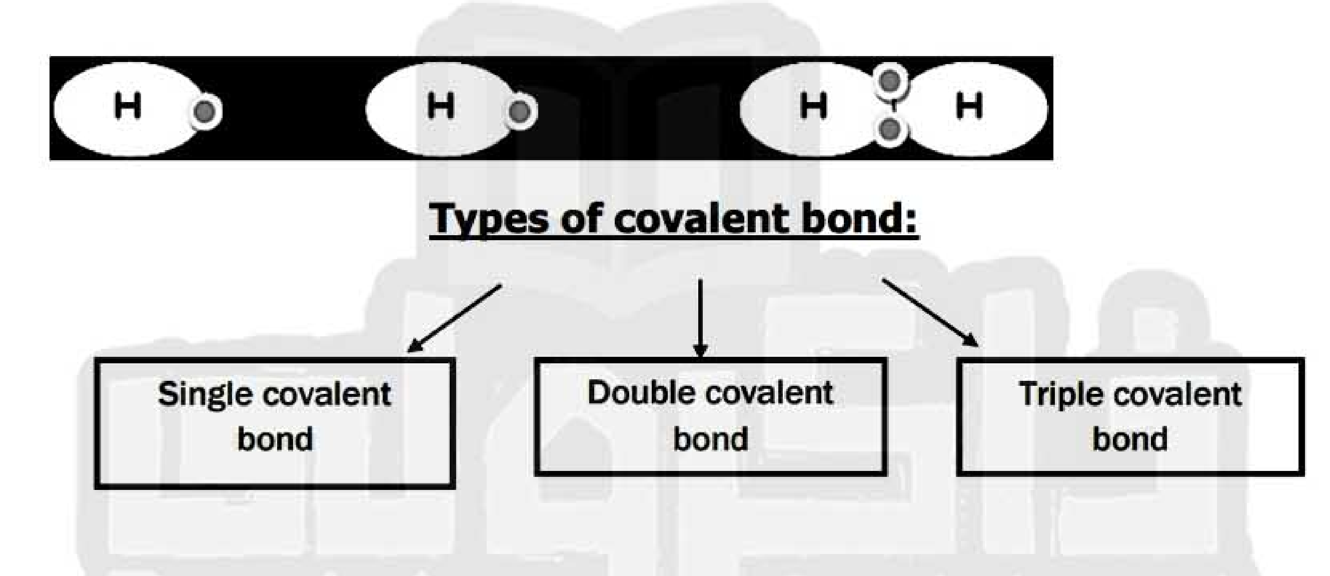
$_8O$ (+8, ±8) 2, 6 — gains two electrons → (+8, ±8) 2, 8 O^{-2}

2- Covalent bond

1. The bond between two non- metals.
2. Each atom shares other atom with the same number of electrons from its outer shell to fill their outer energy levels with electrons.

➢ ***Covalent bond:***

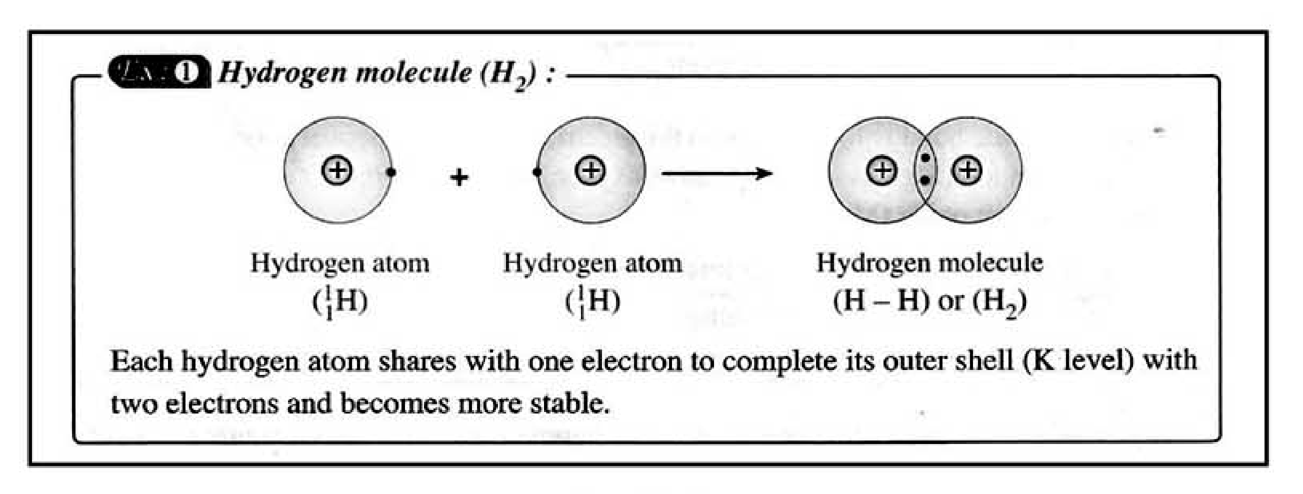
It is a bond occurred among non-metals through the participation of each atom with the same number of electrons filling its outer electron shell.



➢ **Single covalent bond:**

It is the bond which arises between two nonmetal atoms, where each atom shares the other atom with one electron.

It is represented by one line (——) joining the two atoms.

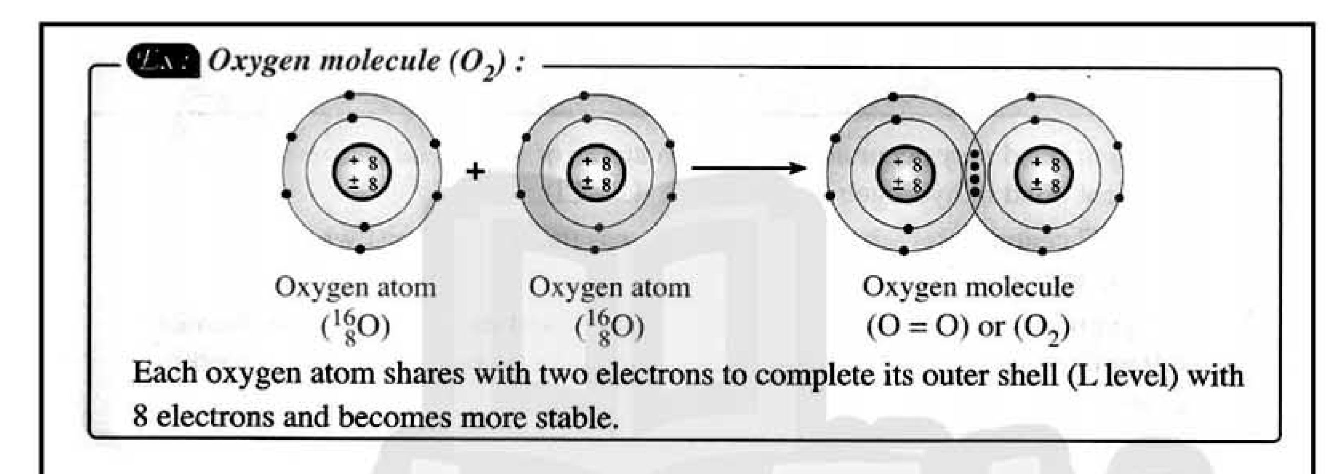


➢ **Double covalent compound:**

It is bond which arises between two nonmetal atoms, where each atom shares the other atom with two electrons.

It is represented by two lines (=) joining the two atoms.

Ex. Oxygen molecule (O2)

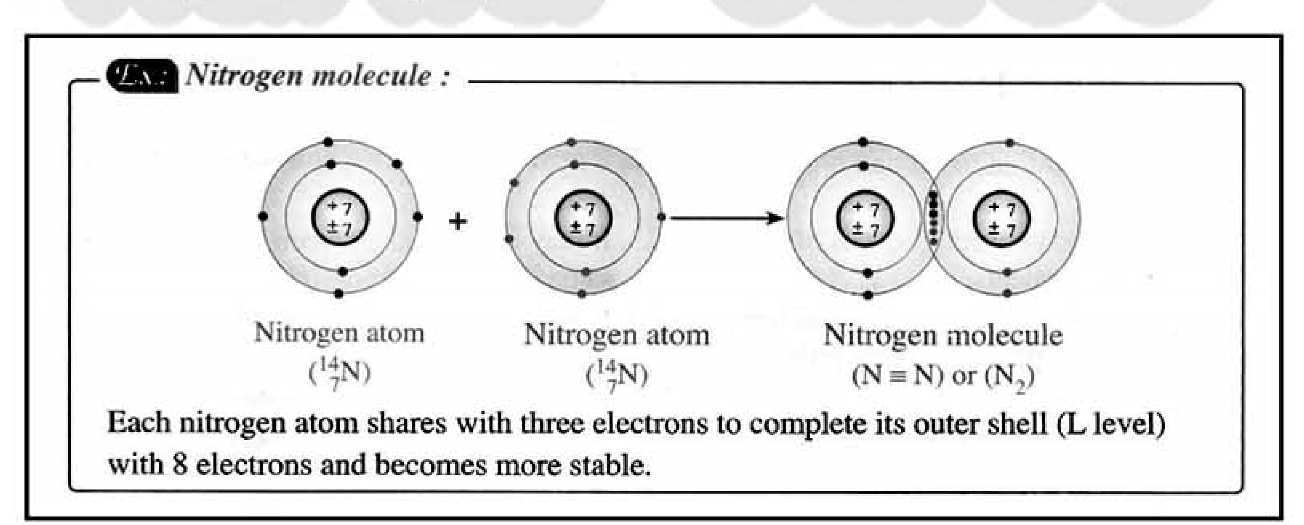


➢**Triple covalent bond:**

It is the bond which arises between two nonmetal atoms, where each atom shares the other atom with three electrons.

It is represented by three lines (≡) joining the two atoms.

Ex. Nitrogen molecule (N3)



Ionic bond	Covalent bond
1. It is formed by loss and gain of electrons.	1. It is formed by sharing of one pair of electrons or more.
2. It arises between metal and non-metal elements.	2. It arises between two non-metal elements.
3. It is formed between 2 atoms of two different elements.	3. It may be formed between 2 atoms of the same element.
4. It is formed due to the electrical attraction between the positive and negative ions.	4. It is formed due to sharing of electrons between the atoms.
5. It has one type.	5. It has three types (single, double and triple).
6. It produces compound molecules only.	6. It produces element and compound molecules.

Worksheet (1)

1. Complete:

1. Ionic bond arises between………………..and……………. elements.

2. During the formation of sodium chloride, chlorine atom ……………..one electron and changes into…………………

3. Atoms of…… …………tend to lose an electron or more during the chemical reaction and changes into…………….

4. In the double covalent bond, each atom shares with………… electrons such as in……………..molecule.

5. Covalent bond is formed among two…………..elements.

6. The types of covalent bonds are……………., ……………. And……………………

7. In………….element, the atoms don't lose or gain any electrons.

8. The number of electrons in oxygen ion is…………….electrons.

2. Give reasons:

1. The bond in the hydrogen molecule is a single covalent bond.

………

………

2. Both sodium ion and oxygen ion have the same number of electrons.

………………………………………………………………………………………

………………………………………………………………………………………

3. Noble gases don't participate in chemical reactions under the ordinary conditions.

………

………

4. Ionic bonds produce compounds only not elements, while the covalent compounds produce both of them.

....

....

3. What is meant by?

1. Metals.

....

....

2. The ion.

....

....

3. Double covalent bond.

....

....

4. Nonmetals.

....

....

4. Compare between ionic bond and covalent bond.

ionic bond	covalent bond
....	....
....	....
....	....
....	....
....	....
....	....

Homework sheet (1)

1. Give reasons:

1. The electric wires are manufactured of copper.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

2. The bond in a molecule of magnesium oxide (MgO) is an ionic bond, where atomic number of Mg=12 and that of O=8.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

3. When an atom gives an electron or more, it becomes a positive ion.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

2. Complete:

1. Elements are classified according to their……………….and electronic structure into……………….,……………….and ……………….

2. All metals are……………………except……………..which is a liquid.

3. Elements of…………………have luster, while elements of ……………..don't have a luster.

4. Nonmetals have…………….than 4 electrons in their outermost energy level.

5. The negative ion carries a number of negative charges equal to the number of…………………………….



3. What is meant by?

1. Noble gases.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2. Positive ion.

……………………………………………………………………………………………………

……………………………………………………………………………………………………



lesson 2
Chemical Compound

➢**The valency**: Is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

G.R: Atoms gain, lose or shares electrons during a chemical reaction.
To complete their outer energy shells with 8 electrons to be stable.

➢**Table of some elements & their valence electrons**

Element	Atomic number	Electronic configuration K	L	M	N	During chemical reaction	Formed ion	Valency
Sodium ($^{23}_{11}Na$)	11	2	8	1		- loses one electron.	Na^+	Monovalent
Chlorine ($^{35}_{17}Cl$)	17	2	8	7		- gains or shares with one electron.	Cl^-	Monovalent
Oxygen ($^{16}_{8}O$)	8	2	6			- gains or shares with two electrons.	O^{--}	Divalent
Magnesium ($^{24}_{12}Mg$)	12	2	8	2		- loses two electrons.	Mg^{++}	Divalent
Aluminium ($^{27}_{13}Al$)	13	2	8	3		- loses three electrons.	Al^{+++}	Trivalent

The valency of some metals:

Metal	Valency	Metal	Valency	Metal	Valency
Lithium (Li) Potassium (K) Sodium (Na) Silver (Ag) Copper I (Cu)	Monovalent (1)	Calcium (Ca) Magnesium (Mg) Iron II (Fe) Lead (Pb) Copper II (Cu) Mercury (Hg)	Divalent (2)	Aluminium (Al) Gold (Au) Iron III (Fe)	Trivalent (3)

The valency of some non-metals:

Non-metal	Valency
Hydrogen (H) Chlorine (Cl) Fluorine (F) Bromine (Br) Iodine (I)	Monovalent (1)
Sulphur (S) Oxygen (O)	Divalent (2)
Nitrogen (N) Phosphorus (P)	Trivalent (3)

❖ **The valency of Noble gases is zero because their outer electron shell is completely filled with electrons.**

➢The atomic group:

It is a set of atoms of different elements joined together behave like one atom during a chemical reaction, having its own valency and it is not existed solely.

The valency of atomic gropes (radicals):

Atomic group	Valency	Atomic group	Valency	Atomic group	Valency
Hydroxide $(OH)^-$ Bicarbonate $(HCO_3)^-$ Nitrate $(NO_3)^-$ Nitrite $(NO_2)^-$ Ammonium $(NH_4)^+$	Monovalent (1)	Carbonate (CO_3^{-2}) Sulphate (SO_4^{-2})	Divalent (2)	Phosphate (PO_4^{-3})	Trivalent (3)

➢Chemical formula:

It is a formula that represents the numbers and types of the atoms in a molecule.

How to write a chemical formula for a compound?

Steps	Examples		
1. Write the name of the compound in words.	Calcium oxide	Sodium sulphate	Aluminium oxide
2. Write the symbol of each element or atomic group down to the name.	Ca O	Na SO_4	Al O
3. Write the valency down to each symbol.	(2) (2)	(1) (2)	(3) (2)
4. Exchange their valencies and simplify them (shortened as much as possible)	$Ca_{2\,1}\ O_{2\,1}$	$Na_2\ (SO_4)_1$	$Al_2\ O_3$
5. You don't have to write the one (1)	CaO	Na_2SO_4	$Al_2\ O_3$

N.B: in case of atomic groups if the number is not (1) put the atomic group between brackets and write the number right down to it.

➢Types of compounds:

They are classified according to their properties into:

1.Acids **2.Bases** **3.Oxides** **4.Salts**

1. Acids:

They are substances which dissociate in water producing positive hydrogen ion **(H^+)**.

➢ Properties of acids:

1-They have a sour taste.

2- They change the color of litmus paper into red due to the presence of the positive hydrogen ions.

3-The chemical formula of all mineral acids begins with hydrogen joined with one of the negative atomic groups or one of the negative nonmetallic ions.

Ex. Sulphoric acid **(H2SO4)**, Nitric acid **(HNO3)**, Hydrochloric acid **(HCL)** and Hydrobromic acid **(HBr)**.

Mineral acids are classified into :

A Oxygenated acids

They are formed when hydrogen joined with one of the negative atomic groups (except OH^- group).

Examples :

- Sulphuric acid (H_2SO_4)
- Nitric acid (HNO_3)

B Non-oxygenated acids

They are formed when hydrogen joined with one of negative non-metal ions such as chlorine (Cl^-) and bromine(Br^-).

Examples :

- Hydrochloric acid (HCl)
- Hydrobromic acid (HBr)

2. Bases (alkalies):

They are substances that dissociate in water producing negative hydroxide ions **(OH^-)**.

➢ Properties of bases:

1-Their aqueous solutions have a bitter taste and feel slippery .

2-They change the colour of litmus paper into blue due to the presence of negative hydroxide ions **(OH^-)**.

3-The chemical formula of all alkalies ends with **(OH)** group.

Ex. Sodium hydroxide **(NaOH)**, potassium hydroxide **(KOH)** and calcium hydroxide **Ca $(OH)_2$**.

Acids	Bases
1. They are substances which dissociate in water producing hydrogen ions $(H)^+$	- They are substances which dissociate in water producing hydroxide ions $(OH)^-$
2. The symbol of all the mineral acids begins with hydrogen (H).	- The symbol of all alkalis ends with (OH) group.
3. They have a sour taste.	- They have a bitter taste.
4. They change the colour of litmus paper to be red due to the presence of hydrogen ions $(H)^+$	- They change the colour of litmus paper to be blue due to the presence of hydroxide ions $(OH)^-$.
Ex.: H_2SO_4 & HCl	Ex.: NaOH & $Ca(OH)_2$

3- Oxides:

Are resulted from the combination between oxygen and an element even though it is metal or non-metal.

➢ **Example**

1. Sodium Oxide (Na2O). **(Metal Oxide)**
2. Aluminium Oxide (Al2O3). **(Metal Oxide)**
3. Carbon dioxide (CO2). **(Non-Metal Oxide)**
4. Sulphur trioxide (SO3). **(Non-Metal Oxide)**

Oxides are divided into

A Metal oxides

They are formed from the combination of **oxygen** with **metal**

Examples:

(1) Sodium oxide Na_2O

(2) Calcium oxide CaO

B Non-metal oxides

They are formed from the combination of **oxygen** with **non-metal**

Examples:

(1) Carbon dioxide CO_2

(2) Sulphur trioxide SO_3

4- Salts:

Are produced as a result of the chemical combination of a positive metal ion or a positive atomic group with a negative atomic group or a negative ion (except oxygen).

➢ **Examples:**

Salts soluble in water	Salts insoluble in water
1- Sodium chloride ($NaCl$). 2- Potassium Sulphate (K_2SO_4). 3- Calcium Nitrate $Ca(NO_3)_2$. 4- Magnesium Carbonate ($MgCO_3$). 5- Sodium Sulphide (Na_2S).	1- Silver Chloride ($AgCl$). 2- Lead iodine (PbI_2). 3- Lead Sulphate ($PbSO_4$).



Worksheet (2)

1. Complete:

1. The difference between nitrate group and nitrite group is one ……….. atom.

2. If the chemical formula of aluminum sulphate is Al2(SO4)3, so the valency of aluminum is………….while the valency of sulphate group is …………………

3. The chemical formula of a magnesium sulphate is………………. while that of calcium nitrate is…………………

4. Compounds are classified according to their properties into…………., ……………., ………………and…………………

5. Acids turn litmus paper to ……………..due to the presence of……. Ion, while bases turn litmus paper to………………due to the presence of……………ion.

6. We can use………………to distinguish between acids and bases.

7. Salts are produced as a result of combination of a positive metal ion with a negative………………or a negative…………..except …………..ion.

8. Salts are variant in some of their properties such as……………., ……………., ……………………and………………

2. Give reasons:

1. The valency of noble gases is zero.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2. The chemical formula of sodium carbonate is (Na2CO3).

……………………………………………………………………………………………………

……………………………………………………………………………………………………

3. Write the scientific term:

1. The number of electrons gained, lost or even shared by an atom during a chemical reaction. (……………………)

2. A formula represents the number and types of atoms in a molecule. (……………………)

3. Some nonmetal elements have more than one valency. (……………………)

4. They are compounds resulted from the combination between oxygen and an element even through it is metal or nonmetal. (……………………)

4. Write the chemical formula of the following compounds:

1. Copper nitrate: ……………………………………………………………………

2. Sodium carbonate: ……………………………………………………………………

3. Aluminum oxide:……………………………………………………………………

4. Table salt: ……………………………………………………………………

Homework sheet (2)

1. Complete:

1. The valency of iron is……………in ferrous chloride, while in ferric chloride is……………

2. Some nonmetallic elements have more than one valency such as …………………and…………………

3. Phosphorous element has two valences which are………………and ………………

4. The atomic group is a set of atoms of different elements jointed together acts as………………during chemical reactions and has its own ………………………

5. The valency of carbonate group is………………while that of bicarbonate group is…………………

6. On dissolving in water, acids give……………………ion, while bases give……………ion

2. Write the scientific term:

1. Substances are dissociated in water producing negative hydroxide ions. (……………………)

2. A set of atoms joined together, behave like one atom only, having a special valency and can't be existed solely. (……………………)

3. They are substances which dissociate in water producing positive hydrogen ion. (……………………)

3. Give reasons:

1. Acids have an effect on litmus paper which is different from bases.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2. Both nitrate and carbonate groups have the same number of atoms but differ in their valencies.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

4. Write the chemical formula of the following compounds:

1. Potassium chloride: ………………………………………………………………

2. Silver nitrate: ……………………………………………………………………

3. Copper sulphate: …………………………………………………………………

4. Calcium chloride: …………………………………………………………………

lesson (3)

Chemical equations & chemical reactions:

Chemical reactions are used to transfer the less used substances (reactants) into useful substances (products).

➢Chemical reaction:

It is a process that involves breaking the existing bonds in the reactant molecules and forming new bonds in the products.

➢Chemical equation:

It is a set of symbols and chemical formula representing the reactants and products molecules in the chemical reaction and it represents the conditions of the reaction.

The chemical equation must be balanced such that the number of atoms entering a reaction equals the number of atoms resulting from this reaction.

i.e. the total amount of the reactant masses = the total amount of the product masses.

Ex:

$$2Mg + O_2 \xrightarrow{\triangle} 2MgO$$

$$H_2 + Cl_2 \longrightarrow 2HCl$$

➢Law of constant ratios:

The chemical compound is produced from a chemical combination of atoms of two or more elements by constant weight ratios.

Ex. $2Mg + O_2 \xrightarrow{heat} 2MgO$

$(2\times24) + (2\times16)$ $\quad$ $2(24+16)$

$48 + 32$ $\quad$ 2×40

$80 = 80$

$24gm + 16gm = 40gm$

Types of chemical reactions

1- Direct chemical reactions

A) Element + Element

1- (2 non-metals):

C (non-metal) + O_2 (non-metal) ⟶ CO_2

$H_2 + Cl_2 \longrightarrow 2\,HCl$

2- (Metal& non-metal):

$2\,Mg$ (metal) + O_2 (non-metal) ⟶ $2\,MgO$

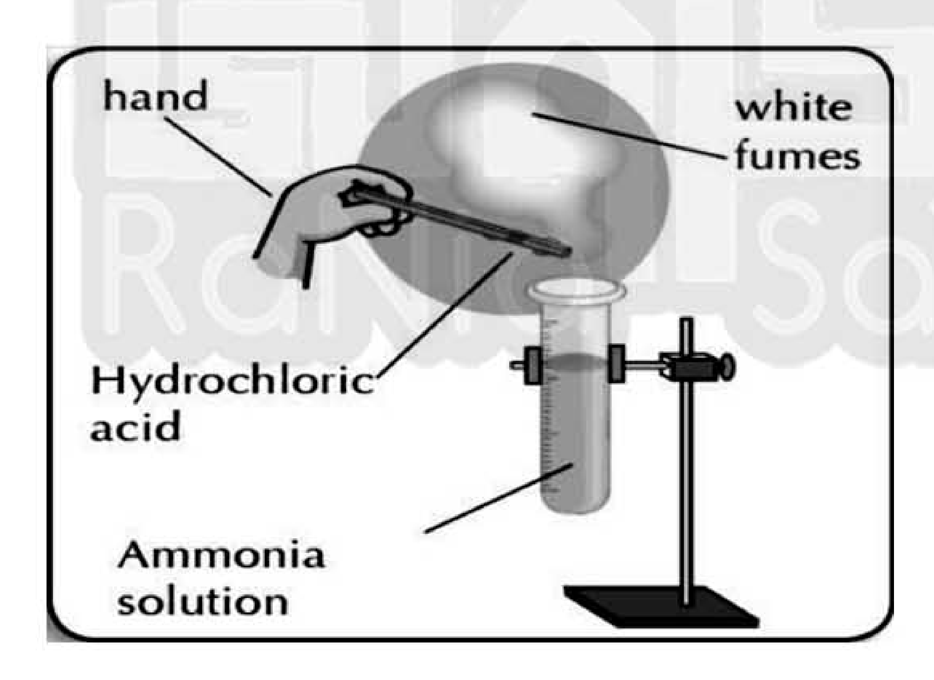
B) Element + Compound

$2\,CO$ (Compound) + O_2 (element) ⟶ $2CO_2$

$2\,NO + O_2 \longrightarrow 2\,NO_2$

C) Compound + Compound

$NH_3 + HCl \xrightarrow{Conc} NH_4Cl$.
(White clouds)



➢Chemical reactions in our life:

* Chemical reactions are used in many industries as medicines, fertilizers, fuel, plastics & others.

* Chemical reactions also have **negative effects** as the emissions that pollute the air such as:

1- Fuel burning:

- Produces Carbon dioxide (CO_2) which:
    - ❖ Increases the atmospheric temperature (greenhouse effect).
    - ❖ Permits the penetration of thermal rays from the sun & never let them back.
- Carbon monoxide (CO): causes headache, fainting, and stomach aches & may lead to death.

2- Sulphur oxides:

They are acidic gases causing respiratory systems diseases & building corrosion (SO_2 & SO_3).

3- Nitrogen oxides:

which resulted from lightning, they are poisonous & affect the nervous system and the eye.

4- Burning of coal & Cellulose fibers such as papers & cigarettes:

causing lung cancer.

Worksheet (3)

1. Complete:

1. The chemical reaction is the process in which bonds existing in the reactants are…………………and forming new bonds in……………
2. The chemical equation is a set of………………and………………… expressing the reactants and…………………in the chemical reaction.
3. If 48 gms of magnesium combine with 32 gms of oxygen, they produce ………………gms of…………………
4. Burning of coal and cellulose fibers causes…………………and ……………………
5. $C + O2 \longrightarrow$ ……………………

2. What is meant by :

1. Chemical reaction:

……………………………………………………………………………………………………

2. Chemical equation

……………………………………………………………………………………………………

3. Law of constant ratios

……………………………………………………………………………………………………

3. Put (√) or (X) and correct the wrong ones:

1. Burning of cigarettes causes' lung cancer. (   )
2. By increasing the ratio of carbon dioxide, the air temperature decreases. (   )
3. Silver chloride salt is water soluble. (   )
4. In the chemical reaction, the bonds of reactants and products are broken. (   )
5. When ammonia gas reacts with hydrochloric acid, white fumes of ammonium chloride are formed. (   )
6. Burning fuels produce harmful gases which lead to dangerous effect on environment and human being. (   )

Homework sheet (3)

1. What is meant by :

1. Direct combination reactions

………

2. Fuel burning

………

2. Complete:

1. Sulphur oxides such as………………and…………………are acidic gases which cause………………and…………………

2. The ………………bond in oxygen molecule is broken to give ……………………

3. Combination of carbon with oxygen gives……………………gas and this reaction is considered………………reaction.

4. Carbon monoxide is a dangerous gas which causes………………, ………………and……………………

5. 2NO + O2 ⟶ ……………………

3. Calculate the masses of reactants and products in the following reactions:

Knowing that the mass of (S= 32 gm, O = 16 gm)

$S + O_2 \Rightarrow SO_2$



Unit Two
Force and motion

Lesson 1: Fundamental forces . in nature

Lesson 2: Accompanied force .with motion

Lesson 3: Motion.

Lesson 1
Fundamental forces in nature

➢Types of force:

1. Attraction forces.
2. Electromagnetic forces.
3. Nuclear forces (Strong and weak forces).

Force:

Is an effect attempts to change the objects phase from being static to motion or vice versa or attempts to change the motion direction.

(or)

It is an external factor effects on the object to move it in a certain direction.

First: Attraction forces

Ex: The attraction forces (gravity) between the Earth and objects. So, Earth attracts object to its center by a force known as the object weight, this force increases when the object mass becomes larger.

➢Object Weight

It is the earth's ability to attract objects.

(or)

The force which attracts objects to Earth to its center.

Unit ⟶ measured by **Newton.**

➢You can calculate the object weight By using the following law:

An object weight (W) = Object mass (m) x Earth's gravity acceleration (g)

$$W = m \times g$$

Example:

Calculate the weight of an object if its mass is 100 Kg if the Earth's gravity acceleration is 9.8 m/s2

Solution: Mass = 100 Kg g = 9.8 m/s2 W= ??

W = m x g = 100 x 9.8 = 980 Newton

Notes:

- The weight is a changed value, while the mass is constant.
- By increasing the mass the weight increase.

Second: Electromagnetic forces

A force resulted from passing electricity in an electric wire coiled around soft iron in a device called **electromagnet**.

- **Electromagnet**

1. It is made up of an isolated copper wire coiling around a bar of soft iron.
2. When an electric current passes through it works as a magnet (Electric current has a magnetic effect).

Uses:

1. **Electric winches** (Cranes) to lift scrap iron & car parts.
2. **Electric bell**.

- **Electric generator**: A set which changes mechanical energy into electric energy (dynamo).
- **Electric motor**: A set which changes electric energy into mechanical energy as in Fans & blinders.

Third: Nuclear forces

➢Nuclear forces:

It is the energy that stored in the nucleus of some elements.

➢ Scientists have discovered that the atom stores the energy inside its nucleus which is called the massive energy.

➢ The massive energy is followed by forces known as nuclear forces which can be divided into:

1- Weak nuclear forces: Used in medicine& researches to get radioactive elements & radiations.

2- Strong nuclear forces: Used in military purposes to produce electric energy from nuclear energy.

N.B: Egypt hopes to use nuclear energy in producing electricity.



Worksheet (4)

1. Complete:

1. Force can change the……………………of motion of an object.

2. The measuring unit of the object's mass is……………………while that of its weight is……………………

3. Egypt seeks to use……………………energy in producing electricity.

4. Radiant elements and nuclear radiations are used in……………… and……………………

5. Object's center of gravity is the point at the center of the object at which the force of………………affects it.

6. The electromagnet is made up of an isolated………………wire coiling around a bar of……………………

7. Universal forces in nature are divided into four divisions which are attraction force, ………………, ……………………and ……………………

2. Give reasons:

1. On earth, all masses are attracted to the earth itself.
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
2. Gravity acceleration changes on earth's surface from one place to another.
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………



3. Compare between each pair of the following:

1. Mass and Weight

Mass	Weight
....	....
....	....
....	....
....	....
....	....
....	....
....	....
....	....
....	....
....	....
....	....

4. Write the scientific term:

1. A clean source of energy produced from strong nuclear forces.
(......................)
2. The effect that attempts to change the object's phase from being static to motion or vice versa or attempts to change the motion direction.
(......................)
3. The ability of the earth to attract an object to its center.
(......................)
4. An instrument used to change the electric energy into magnetic energy.
(......................)
5. An instrument used in making electric winches and electric bells.
(......................)

Homework sheet (4)

1. Compare between:

Electric generator and Electric motor.

Electric generator	Electric motor
....	....
....	....
....	....
....	....
....	....

2. Complete:

1. When you kick a static ball by your foot, a....................acts it causing its.......................
2. Earth's gravity acceleration is changed from a place to another on Earth's surface because of................................
3. An atom stores a massive amount of energy inside its.........................
4. Electric motor is used in the manufacture of...........................
5. The idea of how the electromagnet works is to change .... to change into.........................
6. Weak nuclear forces are used in...............................

3. Give reasons:

1. The importance of dynamo in the case of cutting off the electric current.
....
....
....
2. The importance of nuclear forces.
....
....
....

Lesson 2
Accompanied forces with motion

We will study three types of forces:

1- Inertia. 2- Friction. 3- Forces inside living systems.

▪ First: Inertia:

Inertia:

It is a property of an object to resist the change of its phase from rest to motion in a regular speed and in a straight line unless an external force acted upon it.

It appears in

- Buses passengers rushed forward when the bus suddenly stop.
- Buses passengers rushed backward when the bus start moving after was in rest.
- Football player rushed forward when he is tripped.
- Deliver the paper carrying a coin suddenly.

Ex: 1 The passengers and driver in a moving bus (vehicle) are rushed forward when the bus stops suddenly.

Interpretation :

When the car or the bus stops suddenly, passengers and driver try to maintain their state of motion, so they rush (force) forward.

It's clear that objects resist change in its state being in rest or motion due to inertia

Technological application: (seat belts)

Work on stopping the forces of inertia not to injure (hurt) car or plane passengers when a sudden change in motion occurs.



▪ Second: friction:

A force resulted from the friction between the objects and surrounding mediums.

Benefits of friction:

- Prevent slipping during walking.
- Helps in stopping and starting the motion of cars.
- Helps in burning of matches.

Harms of friction:

- Loss of mechanical energy because mechanical energy changes to heat.
- It produces heat energy due to the friction between some parts of the machines this heat stretches these parts and affects their performance and tears out fast.
- Erosion of machines parts and damages them.

How to limit the friction force?

1. Cars, ships, rockets, and fish have a streamlined shape.
   - ***To reduce the air and water resistance***
2. Lubricating and oiling mechanical machines.
   - ***To reduce the friction between moving parts of machines and prevent their erosion***

N.B: Car tires are covered with a very coarse substance. (G.R)

- To increase friction between tires and the road to help car in starting motion and stopping

▪ Third: forces inside living systems:

There are forces inside living systems enable living organisms to do their different biological operations such as:

- Heart muscles contraction and relaxation.
- Pulse inside the blood vessels.
- Liquids transport through pores and the wall of the cells from low concentration.



Worksheet (5)

1. Complete:

1. On rubbing matches on the side of a matchbox,…………………… Produces…………………
2. ……………………and……………………are from accompanied forces with motion.
3. Electric fan still works for few seconds after cutting the electric current due to…………………force.
4. Friction causes a great loss of mechanical energy because this energy is changed into……………………energy.
5. …………………force prevents feet from slipping on roads during …………………
6. The contraction and……………………of muscles help the body organ ……………………

2. Give reasons:

1. Importance of the forces inside living systems.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2. Lubricating and oiling mechanical machines.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

3. Car tires are covered with a very coarse substance.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

4. Once you use the brakes of a moving bicycle, it will stop.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

4. What is meant by?

1. Force of Inertia:

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2. Friction force:

……………………………………………………………………………………………………

……………………………………………………………………………………………………



Homework sheet (5)

1. Put (√) or (X) and correct the wrong ones:

1. Friction is the property of an object has to resist the change of its phases. ( )

2. Pulse inside blood vessels help in pumping blood all over the body organs.( )

3. Friction causes a great loss of electric energy because this energy is changed into heat energy. ( )

4. Friction always opposes motion. ( )

5. Safety belts in cars work on increasing the forces of inertia. ( )

2. Complete:

1. Any object inside a moving bus has the same………………….of bus so, when the bus stops suddenly, objects fall on the ground due to the force of……………………..

2. ……………………..forces are resistant forces originate between a moving object and the medium touching it.

3. Heart muscle contraction and……………………..help heart to pump ………………all over the body.

4. …………………..inside blood vessels help blood rise against ……………………..

5. Liquids transport through the walls of the cells from the……………. concentration to the……………………..concentration.

6. The car brake performance is an application of……………………..

3. Give reasons:

1. The car passengers and driver are rushed forward when the moving car stops suddenly.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2. Policemen advise drivers using safety belts in cars.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

3. The fan is going to turn after the electric current goes off.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

4. Body muscles contract and relax.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

Lesson 3
Motion

➢Relative motion:

It is the change in an object position or direction with the time passes relative to another object or a fixed point known as a frame of reference.

Types of motion:

1- Periodic motion:

- It is a motion which is regularly repeated in equal periods of time.
- It doesn't have initial or final position

Examples:

1. Vibrating motion: as in the simple pendulum.
2. Circular motion: as a fan arm while it is on.
3. Wave motion: as when a piece of cork is thrown in water.

2- Transitional motion:

- It is a motion in which the object's position is changed relative to a fixed point from time to time.
- It has initial & final position.

Examples:

1. Train motion .
2. Bike motion.



Applications on wave motion:

Waves are divided into two types:

Mechanical waves	Electromagnetic waves
1. They are produced by the vibration of the medium particles.	1. They are accompanied by electric and magnetic Fields.
2. They need a medium to transfer through.	2. They spread in all media and space.
3. Their speed is relatively low. (speed of sound is about 340 m/s).	3. Their speed is very high (speed of light is about 300 million m/s
Examples: (Sound waves - Water waves).	Examples: (Light waves - X-ray – Radio and TV waves - Wireless wave - U.V ray - Infrared rays).

❖ Give reasons: **Although the thunder& lightning happens at the same time just before raining, we see Lightning before hearing thunder.**

- **Because** the speed of light is greater than the speed of sound. Thunder sound transfers in the form of mechanical waves which needs a medium to travel through it as air. Lightning flash transfers in the form of electromagnetic wave which doesn't need a medium

❖ Give reasons **We receive the sun light but we don't hear the sound of solar explosion**

- Because the light is electromagnetic wave that doesn't need a medium to transfer through , but sound is a mechanical wave that needs a medium to travel through

Some technological applications for Mechanical waves :

1. Examining and curing sets for human body using sound waves.
2. Stringed musical instruments as violin and guitar.
3. Amplifiers and controlling sound's sets.

Some technological applications of electromagnetic waves:

- The rays Applications:

1-Visible light (Seen):

Photographic cameras - T.V cameras - data shows.

2- X- rays:

Detecting the bone fracture – examining mineral raw in industry (to show errors, pores and cracks).

3- Gamma rays:

Medical purposes as the treatment & discovering some swellings.

4- Ultraviolet rays (UV):

To sterilize the sets of surgical operations rooms, because they have the property to kill microbes.

5- Infrared rays (IR):

- Cooking food as they have heat effect
- In remote sets to control electric sets.
- Remote sensing instrument to photograph earth surface using satellites.
- Night vision sets in military

Worksheet (6)

1. Complete:

1. Translational motion is not considered as periodic motion because it has ……………….and…………………….points and it doesn't …………………its motion.

2. The waves causing the wave motion are divided into two types which are …………………and……………………waves.

3. Relative motion is the change in an object……………………….or …………………….as the time passes relative to another object or fixed point known as…………………

4. The motion of simple pendulum is known as………………motion, while that is produced from throwing a stone in water is known as ……………motion.

5. Electromagnetic waves are accompanied by…………………forces.

6. Thunder sound transfers in a form of……………….waves, whereas lightning flash transfers in a form of……………………waves.

7. The irregular speed represented graphically by a ………………… line passing through the point of……………………………

8. …………………..rays are used in sterilizing the sets of surgical operation rooms, while……………………rays are used in discovering some swellings.

2. Give reasons:

1. Gamma rays have medical purposes.

………

………

2. The motion of the simple pendulum is a periodic motion.

………

………



3. Ultraviolet rays are used to sterilize the sets of surgical operation rooms.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

3. What is meant by ?

1. Relative motion:

……………………………………………………………………………………………………

2. Periodic motion:

……………………………………………………………………………………………………

3. Translational motion:

……………………………………………………………………………………………………

4. Speed:

……………………………………………………………………………………………………

5. Displacement:

……………………………………………………………………………………………………

Homework sheet (6)

1. What is meant by ?

1. Mechanical waves:

……………………………………………………………………………………………………

2. Electromagnetic waves:

……………………………………………………………………………………………………

3. A static object:

……………………………………………………………………………………………………

4. An object moves with irregular speeds:

……………………………………………………………………………………………………

2. Give reasons:

1. We receive the sunlight, while we don't hear the sound of solar explosion.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2. A train motion is a translational motion.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

3. Sound and water waves are mechanical waves.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

3. Complete:

1. Visible light is used in …………………, …………………and …………………
2. Violin and guitar are from…………………musical instruments, while…………….and reed pipe are from…………………musical instruments.
3. Types of motion are………………motion and…………..motion.
4. ………………….is the distance which an object moves away from its original position at any moment In a certain…………………..
5. Mechanical waves are characterized by……………………………
6. Infrared rays are used in cooking food because they have………….. effect property.



Third unit
Earth and Universe

Lesson 1: The Celestial bodies.

Lesson 2: The Earth.

Lesson 3: Rocks and minerals.

Lesson 1

The celestial bodies

➢**Celestial bodies** as stars, plants, moons and rocky bodies rotate in space.

➢Stars:

They are celestial bodies that emit heat and light.

G.R: Astronomers don't measure the distances between stars by kilometers.

Bec. stars far away by millions of kilometers from us.

Astronomers measure the distances between stars by **light year.**

Light year:

The distance covered by light in a year. = 9.467×10^{12} km.

Galaxies:

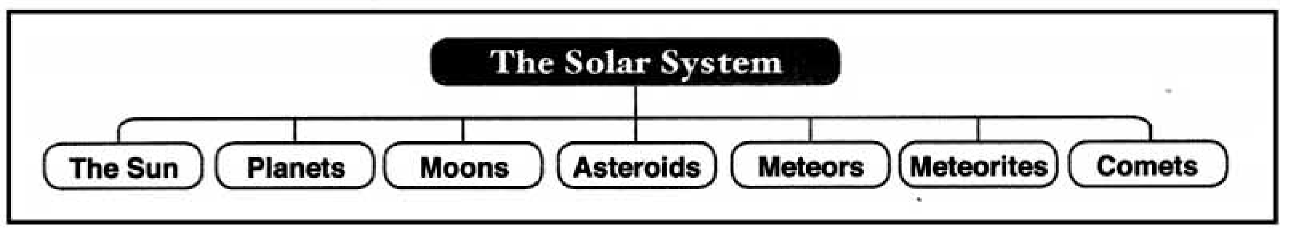
A group of thousands of millions of stars and the biggest unit of the universe.

➢The galaxy of our solar system is "**The milky way or the chopped hay.**"

➢It takes an **oval shape** with coiled **spiral arms**, the sun lies on one of these spiral arms.

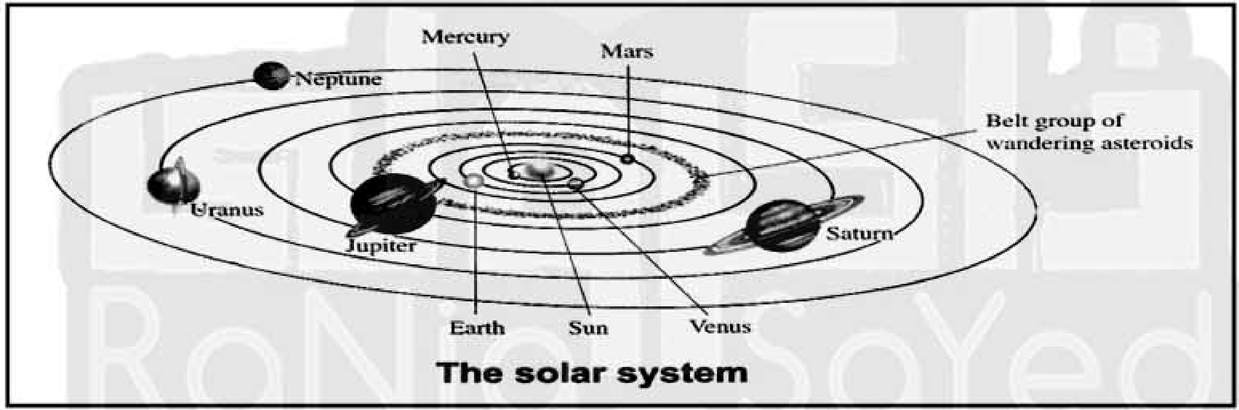
▪The components of the solar system

Stars - 8 Planets - Moons - Celestial bodies (Meteors - Meteorites - Asteroids - Comets).



▪ Planets:

- ❖ They are 8 spherical opaque bodies revolve around the sun in one direction (anti clockwise) in a semi-circular or elliptical path (oval paths).
- ❖ These paths lie in one plane perpendicular to the sun's axis of rotation around itself.



The solar system

➢ Comparison between the inner planets& the outer planets:

Points	The inner planets	The outer planets
Names	Mercury, Venus, Earth& Mars.	Jupiter, Saturn, Uranus, Neptune
Distance from sun	The nearest planets to the sun.	The farthest planets from the sun.
Size	They are small solid bodies.	They are big sized (giant planets)
Density	They have high density ranges from (3.3 to 5.5 g/ cm3)	They have low density ranges from (0.7 to 1.3 g /cm3)
Characters	They all have an atmosphere except Mercury.	The presence of a large number of moons rotating around them.

Give reasons:

1. The outer planets have low densities.

Because they consist of gaseous elements such as hydrogen& helium.

2. The presence of the hydrogen gas in a solidified state in the outer planets group.

Due to the high pressure& extreme coldness on these planet surfaces.

▪Moons:

They are small planets that are affected by the gravity of the larger planets and rotate around them as in case of the moon.

- Each planet has a certain numbers of moons around it.

Planets	No of moons rotating around it
Mercury	None
Venus	None
Earth	1
Mars	2
Jupiter	62
Saturn	60
Uranus	27
Neptune	12

➢The components of the celestial bodies:

	Asteroids	Meteors	Meteorites	Comets
Formed from	Stones & rocks	Metals & rocks	Metals & rocks	Rocks, ice & solidified gases
structure	**1**. They rotate between the two orbits of mars & Jupiter in a certain region known as the wonderer Asteroid belt. **2**. This belt separates the Inner planets from outer planets.	**1**. They fall within the atmosphere & burn **due to** the heat produced from their friction with air. **2**. They are in the form of luminous arrows that can be seen by naked eye.	**1**. They fall & did not Burn completely. **2**. They penetrate the atmosphere some parts of them reach the earth's surface. **3**. The biggest Meteorite till now exists at the southern west of Africa of mass 80 tons	**1**. The comets consists of **head** which Contains ice spheres which is a mixture of Solidified gases: CO_2, Nitrogen & Methane gas, Rocky parts, dust& water molecules. **Tail** which Consists of a gaseous cloud

N.B:

1- Comets rotate around the sun in more elongated elliptical orbits intersecting with the orbits of the planets.

2- The most famous comet is HALLEY which was seen& studied in 1986, it completes one rotation around the sun every 76 years.

The difference in gravity force on the planet's surface:

1- The scientist Isaac Newton proved that there is a force of gravity between any two objects in the space.

2- This force depends upon **the mass of the 2 objects** & **The distance between them**.

3- All planets in the solar system revolve around the sun by action of sun gravity on them.

4- The gravity on the surface of any planets differs from that in any other planet.

Telescope:

It is one of the most important instruments that are used in identifying the celestial bodies.

➢ **Types of telescopes**:
Refracting telescopes and ***Reflecting*** telescopes.

➢ **Function (uses) of telescopes**: they form large image for (identifying) celestial bodies .





Worksheet (7)

Complete:

1-………………planet has 27 moons revolving around it, while …………………planet has 12 moons revolving around it

2-The Earth lies between………………and…………………planets, while the…………………planet lies between Neptune and Saturn

3-The force of gravity between two objects depends on………………… and……………………between them

4-The nearest planet to the sun is…………while the farthest planet is ………..

5-The number of moons revolving around Jupiter is…………., while that revolve system includes……………., ……………., moons, …………………., …………………and meteors

6-The most famous comet inhabitants of the earth is…………………… and it completes its revolution around the sun every……………..years

7-Asteroids are formed of…………………which rotate around the …………………in a certain region

Give reasons:

1-The density of inner planets is high

……………………………………………………………………………………………………

2-No one can see Halley's comet more than two times in his life

……………………………………………………………………………………………………

3-The outer planets are called giant planets

……………………………………………………………………………………………………

Compare between each pair of the following:

1-Inner planets and outer planets

……………………………………………………………………………………………………

……………………………………………………………………………………………………

……………………………………………………………………………………………………

……………………………………………………………………………………………………



2-Meteors and comets

……………………………………………………………………………………………………

……………………………………………………………………………………………………

……………………………………………………………………………………………………

Put (√) or (X) and correct the wrong ones:

1-The distance between stars are measured in kilometers (   )

2-There are eight spherical lighted planets revolving around the sun (   )

3-The small or inner planets are Mercury, Venus, Earth and Saturn (   )

4-The outer planets are composed of rocks and they are relatively small in size (   )

5-Milky way galaxy takes an oval shape with straight arms (   )

Homework sheet (7)

Compare between each pair of the following:

1-Asteroids and planets

....

....

....

2-Celestial body and galaxy

....

....

....

Put (√) or (X) and correct the wrong ones:

1-Venus is the seventh planet according to the distance from the sun ( )

2-The number of moons of the inner planets equals 3 moons ( )

3-The acceleration due to gravity on Saturn planet is large ( )

4-The comet consists of two parts, the head and the tail ( )

5-The telescope is used to study the celestial bodies ( )

Give reasons:

1-Stars seem as very small light points in spite of their big sizes

....

2-The presence of hydrogen gas in a solidified state on the surface of outer planets

....



Complete:

1-Our galaxy is called…………………………..

2-The distance between stars are measured in…………………..unit

3-The head of the comet consists of a mixture of solidified gases of ……………, ………………and………………..and other compounds

4-The smallest planet is …………………, while the biggest planet is ………………

5-The luminous arrows that can be seen in the sky at clear nights are called…………………..

6-Asteroids are formed of…………………..which rotate around the …………………..in a certain region

Lesson two
The Earth

1- **The sun** occupies the center of the solar system.
2- The distance between earth& sun is about **150 million Km.**
3- The earth is the **third** planet regarding the distance from the sun, while it is the **fourth** order regarding to volume.

The description of the shape of the earth at the poles & equator:

- The Earth is a spherical object and has slight **flattening** at two poles and indented at equator.
- The tropical radius is about 22 Km larger than the polar radius.

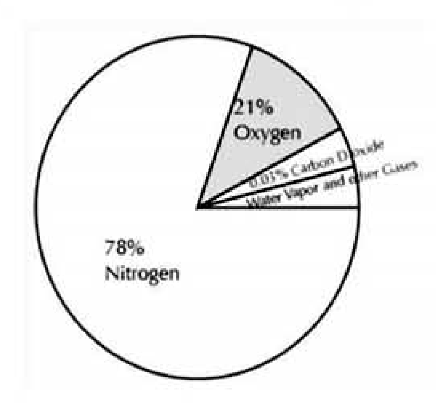
Earth is the biggest mass (planet) in the inner planets where its mass is **5.9 x 1024 kg.**

G.R: Concerning the volume, the Earth occupies the fourth order.
Bec. Earth is bigger than the inner planets its average radius is about 6368 kilometers.

Characteristics of the earth supporting the continuity of life:

1- **The atmosphere**
2- **The hydrosphere**
3- **The suitable temperature**
4- **The gravity**
5- **The atmospheric pressure**

1- The Earth's Atmosphere: A mixture of gases that surround the Earth



➢ Components of the atmosphere Percentage

1- Oxygen **21 %**
2- Nitrogen **78 %**
3- Carbon dioxide **0.03 %**
4- Water vapor Variable percent
5- Other gases Very little percent

G.R: The presence of a white colour surrounds the planet Earth.
Bec. Earth surrounded by atmosphere

➢ Importance of atmosphere:

1- Keep temperature suitable to Earth.
2- It has ozone layer which protect us from harmful sunrays (**UV**).
3- It helps in burning of meteors and meteorites.
4- All weather phenomena (**wind-rains**) occur in it.
5- It has important gases as (**O_2 - N_2 - CO_2**).

G.R: The great extension of atmosphere in space is important for Earth's life.
Bec. it helps in complete burning of meteors and decrease speed of meteorites before reaching Earth

2- Earth's hydrosphere

- Water represents **71%** of the Earth surface.
- The salty water represents **97%**, while the fresh water is about **3%**.
- Ground water exists in the pores and cracks of rocks.

➢Importance of water

1- Plant uses it in photosynthesis process.
2- Keep body temperature constant.
3- It form blood and help in digestion process.
4- Keep temperature suitable for man.
5- 50% of organisms live in water.

3- A suitable temperature:

G.R: **Temperature on Earth's surface suits the life of living organisms.**
Bec. Earth is in third order far from the sun makes temperature suitable for life

4- The gravity:

G.R: **Steadfastness of the hydrosphere on the Earth surface.**
- Keeping the Earth surrounded with the atmosphere.
- Constancy and Steadfastness of objects and organisms on Earth's surface.

Bec. Earth has a force of gravity.

5- The suitable atmospheric pressure:

The suitable atmospheric pressure of about **76 cm Hg**.

G.R: **The planet Earth is suitable for life.**
Bec. It has water, gravity, atmosphere, suitable temperature and atmospheric pressure.

➢ **The function of:**

1. Carbon dioxide gas:
It is used in photosynthesis process by green plants to form food.

2. Ozone layer.
It is used to protect the living organisms from the harmful ultraviolet rays.

3. Oxygen.
It is used in respiration process of living organisms and burning process.

4. Nitrogen gas.
It is used in forming proteins by plants and reducing the effect of oxygen gas during the burning process.

5. Hydrosphere: It is used in many uses such as drinking, washing and food digestion.

The inner structure of Earth

- **The inner part of Earth was a molten form d**ue to high temperature.

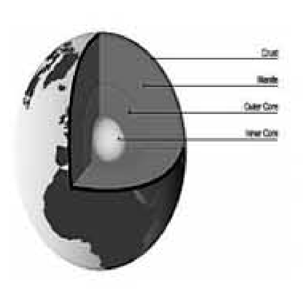
Formation if Earth's layers:

➢ Heavy metals have more density (**iron and nickel**) move towards.

➢ Earth center while lighter components have low density move upward.

The layers of the earth are:
Crust, mantle and core.

1- The crust:
- The light outer layer of the earth.
- Thickness **8 - 50** km.



2- The mantle:
- The middle rocky layer of the earth that lies between crust and core.
- Thickness **2885** km.

3- The core:
- The inner layer of the earth.

Outer core	**Inner core**
It is a layer of molten metals. It's thickness is about **2270** Km.	It is a solid layer rich in iron and nickel. It's thickness is about **1216** Km



Worksheet (8)

Complete:

1-The earth's shape is to be completely circular accompanied with ……………….at the two poles and…………….at the equator

2-…………………and…………………are from characteristics of the planet Earth supporting the continuity of life

3-………………shares in blood formation and stabilizing the body ……………………

4-The outer layer of the Earth is called………………….and the next one is called…………………

5-The percentage of carbon dioxide gas in the atmospheric air is………, while the percentage of oxygen gas is…………………

6-The major component of the atmosphere is…………….gas and it occupies about………………of the air volume

7-The air consists of three main layers which are……………………, …………………and……………………

Give reasons:

1-The tropical radius is larger than the polar radius

……………………………………………………………………………………………………

2-Temperature on the Earth's surface suits the life of living organisms

……………………………………………………………………………………………………

3-Steadfastness of the hydrosphere on the Earth's surface

……………………………………………………………………………………………………

Put (√) or (X) and correct the wrong ones:

1-The Earth's core is formed of two layers, a molten outer core and a solid inner core (   )

2-The water of oceans is fresh water (   )

3-The atmospheric pressure on the Earth's surface is 76 cm.Hg (   )

4-Water covers about 29% of the Earth's surface (   )

5-Surrounding the Earth by an atmospheric envelope is from the characteristics supporting the continuity of life on the Earth (   )

6-Green plants use carbon dioxide in photosynthesis process (   )

What is meant by ?

1-the gravity

....

2-Earth's layers

....

3-Earth's atmosphere

....

4-Salty water

....

Homework sheet (8)

Complete:

1-The normal atmospheric pressure on the Earth's surface is about ……………………

2-The Earth's core is divided into………………core and……………. core

3-The ratio of water vapour in atmospheric air is……………………

4-Concerning the volume, the Earth is the biggest…………………… planet

5-The Earth revolves around the sun by the action of……………….to complete one revolution around the sun in……………….days

6-More than………………of known living organisms live in the aquatic environment

7-The Earth's inner core contains……………….in a solid state

Give reasons:

1-The earth's inner core is rich in iron and nickel

……………………………………………………………………………………………

2-Concerning the volume, the Earth occupies the fourth position

……………………………………………………………………………………………



Lesson 3
Rocks and Minerals

➢Rocks:

A natural solid material exists in the earth's crust & is formed of a group of minerals.

➢Types of rocks according to their mode of formation:

1- Igneous rocks.

2- Sedimentary rocks.

3- Metamorphic rocks.

First: Igneous rocks:

1. Formed from the molten matter underneath earth's crust.
2. If the magma is extruded to the surface in the form of volcanic flows, it is known as lava.

➢Igneous rocks can be divided into (plutonic rocks and volcanic rocks).

The difference between plutonic rocks and volcanic rocks:

Plutonic rocks	Volcanic rocks
- Igneous rocks that formed inside earth's crust at great depth. - Have huge masses covers wide area. - Has a coarse texture with relatively large sized crystals where magma at depth gets cool slowly. **- Ex. Granite.**	- Igneous rocks formed when magma reached the earth surface. - Small masses in the form of flow or lava. - Their crystals have small sized where lava cools quickly on the surface. **- Ex. Basalt.**

➢Granite:

- Its colour is pink or grey.
- The minerals forming it are seen by the naked eye.
- It exists in the eastern desert and Sinai Peninsula.
- This rock is heavy, rough, solid, cohesive and hard breakable.
- The minerals forming the granite are **quartz, feldspar and mica.**

➢Basalt

- It is a dark colored rock.
- Its components cannot be seen by the naked eye.
- It exists in Abu-Zaabal and close to Abu- Rewash and Faiyoum.
- Volcanic rocks contain small holes indicating the extruding of gases from volcanic flows during their cooling and formation of the rock.
- The minerals forming the basalt are **Olivine, pyroxene and feldspar minerals.**

Second: Sedimentary rocks:

1- They are rocks which are formed as a result of the processes of fragmentation and disintegration of the igneous, sedimentary or metamorphic rocks that are previously existed.

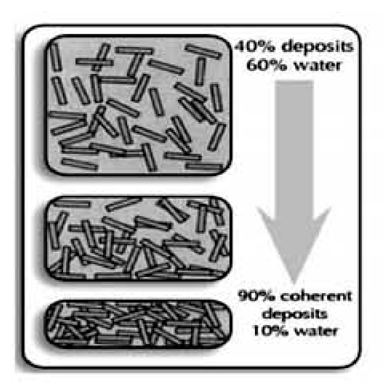
2- After that the detritus (fragmented particles of rocks) is deposited in a watery or an aerial medium, then this deposited particle adhere together forming the sedimentary rocks.

3- Sedimentary rocks form a thin cover that wrap about **75%** of the surface of the Earth solid mass. At the same time, it represents **5%** only of the total volume of the Earth's crust rocks.

➢The formation of sedimentary rocks:

By 3 steps :-

1. Erosion.
2. Transportation.
3. Sedimentation.



Examples

1. Sandstone:

- Is consisted of sand grains that are less than 2mm in diameter.
- The main minerals are the **quartz, feldspar and mica**.
- Colour: **yellow.**
- Texture: **coarse.**
- Shape: **thin layers**.

2. Limestone:

- Consists of a mineral to the precipitation of **calcium carbonate in lime solutions.**
- Colour: **white.**
- Texture: **smooth.**
- It reacts with hydrochloric acid producing effervescence **due to the evolving of carbon dioxide gas.**

Third: Metamorphic rocks:

The rocks which are formed from igneous or sedimentary rocks when they are subjected to high temperature or pressure or both of them.

Example

Marble:

1- Is produced from the **conversion of limestone.**

2- It is a rock with **a rough touch** and **white colour** if it is pure.

3- It has other colours when it contains impurities.

4- It has more solidity and solidarity than the limestone.

Worksheet (9)

Complete:

1-the molten material that exists beneath…………………which is extremely hot thick fluid in the Earth's interior is known as…………… And after its going out to the Earth's surface in the form of ……………. it is called………….

2-Granite is from………………igneous rocks, while the basalt is from ………………igneous rocks

3-The colour of limestone is………………and its texture is…………., while the colour of sandstone is………………and its texture is ………………

4-Marble is resulted from transformation of…………………………

5-Plutonic rocks have crystals with……………size, while volcanic rocks have crystals with…………………size

6-The soil consists of a mixture of……………………air, decayed ……………materials and plant roots

7-When hydrochloric acid is added to limestone, ………………gas is evolved

Give reasons:

1-The crystals of minerals that form the plutonic igneous rock are large-sized

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2-Some kinds of marble have colours

……………………………………………………………………………………………………

……………………………………………………………………………………………………

3-Effervescence is produced when hydrochloric acid is added to a sample of limestone

……………………………………………………………………………………………………

……………………………………………………………………………………………………



What is meant by ?

1-lava

....

2-Magma

....

3-Igneous rocks

....

What will happen if:

1-Sedimentary rocks are subjected to high temperature and pressure

....

2-The minerals that form the volcanic igneous rocks take a short time of crystallization

....

3-You add Hydrochloric acid to limestone

....

4-Decreasing the temperature of lava on the earth's surface rapidly

....

Homework sheet (9)

What is meant by ?

1-Soil

……………………………………………………………………………………………………

2-Metamorphic rocks

……………………………………………………………………………………………………

3-Sedimentary rocks

……………………………………………………………………………………………………

Give reasons:

1-Granite has a coarse texture, while Basalt has a smooth texture

……………………………………………………………………………………………………

……………………………………………………………………………………………………

2-Volcanic rocks contain small circular holes

……………………………………………………………………………………………………

……………………………………………………………………………………………………

Complete:

1-Rocks are classified according to the way of formation into ………………., …………………….and……………………

2-The igneous rocks are formed of molten material underneath the Earth's crust which is called……………………

3-Basalt is characterized by……………………

4-The sequence of sedimentary rocks formation is……………………, …………………… and……………………

5-…………and……………….are examples of sedimentary rocks.



Extra Exercise

Work sheet (1)

Question (1):

Choose the correct answer:

1. In the triple covalent bond, each atom shares with --------.

(One electron – two electrons – three electrons – four electrons)

2. The bond in sodium chloride molecule is ------- bond.

(Single covalent – double covalent- ionic – triple covalent)

3. All the following are properties of metals except --------.

(they are good conductors of electricity –they are bad conductors of heat – they contain 1,2 or 3 electrons in outermost shell)

Question (2)

Complete the following table:

Element	Its electronic configuration	Its type	Its ion
1. $_{12}Mg$	2 8 2 (K L M)	Metal	Mg^{+2}
2. $_{19}K$			
3. $_{17}Cl$			
4. $_{8}O$			

Question (3)

Write the scientific term:

1. An atom gained one electron or more during the chemical reactions. (---------------)
2. An atom lost one electron or more during the chemical reactions. (---------------)
3. A bond that is formed between sodium atom and chlorine atom to form sodium chloride compound. (---------------)
4. A bond that is resulted from the sharing of each atom with two electrons. (---------------)

Question (4)

Write down the electronic configuration of the atoms of the following elements, then answer:

1. The type of each atom (metal – non metal)
2. The type of each ion (negative – positive)

The elements:

a. Aluminum $_{13}Al$

b. Sulphur $_{16}S$

Worksheet 2

Q1 Compare between:

Type	Acids	Alkalis
Definition	--------------------	-------------------
Properties	-------------------	-------------------
Examples	--------------------	-------------------

Write the chemical formula of the following

1-sodium hydroxide

2- calcium sulphate

3-ammonium chloride

4- magnesium oxide

5- silver chloride

6- ferrous oxide

Work sheet 3

Q1 If you know that:

The mass of Mg= 24, the oxygen mass O = 16

a) Calculate the sum of the masses of the reactants& the products in the following chemical equation:

$2\ Mg + O_2 \longrightarrow 2\ MgO$

Complete the following chemical equations:

$C + O_2 \xrightarrow{\Delta}$

$NH_3 + HCl \longrightarrow$

$2Na + Cl_2 \longrightarrow$

Calculate the masses of reactants and products in the following reactions:

Knowing that the mass of (S= 32 gm, O = 16 gm)

$S + O_2 \longrightarrow SO_2$

Work sheet 4

Q1 Write the scientific term:

1. Earth's gravity force to objects. (--------------)

2. The device which is made of an isolated copper wire coiling around a bar of soft iron& works as a magnet when an electric current passes through it. (---------------)

3. The energy that the atom stores inside its nucleus. (--------------)

4. The force which is used to get radioactive elements& radiations used in medicine& scientific researches. (--------------)

5. The force which is used in producing electric energy from the nuclear energy& in the military purposes. (--------------)

Q2 Complete the following statements:

1. The attraction force (weight) = -------- x ---------.

2. The measuring unit of object's mass is ---------, while the unit of acceleration is -----------.

3. The attraction force increases when the mass of the body------.

4. The book on a table remains static because there is no -------- acting on it.

5. The measuring unit of force is -----------.

Question (3)

Choose the correct answer:

1. Universal forces in nature are -------------.

(attraction forces – electromagnetic forces – nuclear forces –all the previous)

2. The apple falls down due to the effect of -------------.

(electromagnetic forces – attraction forces – nuclear forces)

3. The attraction force is measured in ---------.

(kilogram – coulomb – Newton – m/s^2)

Problems:

1. If you known that the gravity acceleration is $9.8 m/s^2$,calculate the weight (attraction force) of the following:

   a. 50 kg mass ball.

   b. 100 kg mass boy.

2. Calculate the mass of an object if the attraction force equals 60 Newton and the gravity acceleration equals $9.8\ m/s^2$.

Worksheet 5

Q1:

Write the scientific term:

1. The property of an object to resist the change of its phase from rest to motion unless an external force acted upon it. (---------------)

2. The resistance forces originated between the surface of the object in Motion & the medium touching it. (-----------------)

Q2 Give reasons:

1. A football player is rushed forward& falls if he is tripped during running.

----

2. Lubricating& oiling mechanical machines.

--.

3. Policemen advise drivers to use the safety belts.

Work sheet 6

Q1. A)-Write scientific term :

a. The change in an object position or direction with the time passes relative to another object, known as a frame of reference.

(------------------)

2. The motion in which the object's position is changed relative to a fixed point from time to time. (------------------)

3. The wave which is produced by the vibration of a medium particles.

(------------------)

4. The motion which is regularly repeated in equal periods of time

(------------------)

5. The waves which are accompanied by Electric. (------------------)

6-The distance in which an object moves away from its original position at any moment. (------------------)

Write the uses of each:

1. Ultraviolet ray
2. X-ray
3. Infrared rays
4. Gamma ray
5. Visible light

Worksheet 7

Celestial bodies

Q1 Write the scientific term:

1. The distance covered by light in a year. ---------------

2. A group of millions of stars. ---------------

3. It consists of the sun, 8 planets revolving around it.

----

4. The satellite of earth, which is affected by its gravity.

----

5. The celestial bodies which are formed of stones& rocks.

----

6. The celestial bodies which form luminous arrows in the sky.

----

7. Celestial bodies which penetrate the atmosphere& some of them reaches the earth's surface. ---------------

8. Celestial bodies which consist of head& tail and composed of rocks, ice& solidified gases. -------------

9-. The most important instrument that are used in identifying the Celestial bodies. -------------

Q2 Compare between:

Points	Inner planets	Outer planets
1. Size	---------------- ----------------	---------------- ----------------
2. Distance from the sun	---------------- ----------------	---------------- ----------------
3. Density	---------------- ----------------	---------------- ----------------
4. Characters	---------------- ----------------	---------------- ----------------
5. Names	---------------- ----------------	---------------- ----------------

Q3 Complete:

1. The --------- are celestial bodies that emit heat& light.

2. ------------- are the biggest unit of the universe while the galaxy That our system belongs to is called ------------------.

3. -----------------Planet has the biggest number of moons, while Mars has ------------------------- moons only.

4. The head of the comet is a mixture of ---------, ----------, ----& water molecules while the ---------------consists of a gaseous cloud.

5. The two types of telescopes are ----------& --------------.

Work sheet 8

Q1 Complete:

1. The ------------------ occupies the centre of the solar system.
2. The distance between earth& sun is about-------------
3. The earth is the ------ planet regarding the distance from the sun, while it is the ---------------------- order regarding to volume.
4. The suitable atmospheric pressure is about -------------------.
5. The salty water represents -------------% , while the fresh water is about------------------%
6. The layers of the earth are ---------, --------& -----------

Q2. Write the function of:

1Carbon dioxide gas:

----

1. Ozone layer.

----

3. Oxygen.

----

4. Nitrogen gas.

Q4 Write the scientific term:

1. The inner layer of the earth. ------------------
2. The outer layer of the earth. ------------------
3. The middle layer of the earth that lies between crust& core.

Q5 Compare between:

	Outer core	Inner core
	-----------------	-----------------
	-----------------	-----------------
	-----------------	-----------------
	-----------------	-----------------
	-----------------	-----------------
	-----------------	-----------------
	-----------------	-----------------

Work sheet 9

Q1 Write the scientific term:

1. A natural solid material exists in the earth's crust& is formed of a group of minerals. ----------------

2. A thin, fragmented& loosened layer consists of a mixture of mineral salts, water, air& decayed organic substances. -----------

3. The type of rocks which are formed from the molten matter underneath the earth's crust. ----------------

4. The type of igneous rocks which are formed when magma reaches earth's surface in the form of a flow of lava. ----------------

5. The type of rocks which are formed when other rocks are exposed to high pressure& temperature. -------------

6. The mineral which is formed of a mixture of calcium& iron silicate. ----------------

Q3. Complete:

1. The molten matter underneath the earth surface is called -------------------, while when they reach the earth surface they form ------------.

2. ------------& ------------are examples of igneous rocks.

3. Granite consists of 3 main minerals which are ----------, -------------&-------------.

4. Basalt consists of -----------& --------------.

5. The sedimentary rocks are formed of 3 processes which are:

---.

6. Lime stone reacts with hydrochloric acid producing

---.



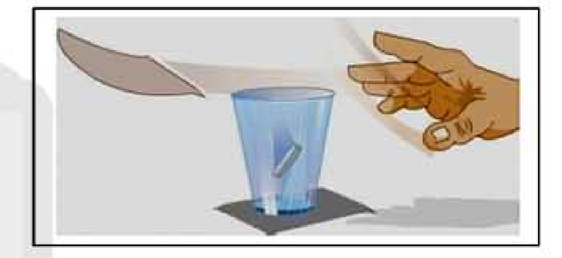
Practical sheet

Q1Write the observation& Conclusion for the following experiments:

Exp❶:

When you put a piece of cardboard paper on the top of a glass cup& put a coin on it, then deliver a quick hit to the paper with your fore finger.





Observation:

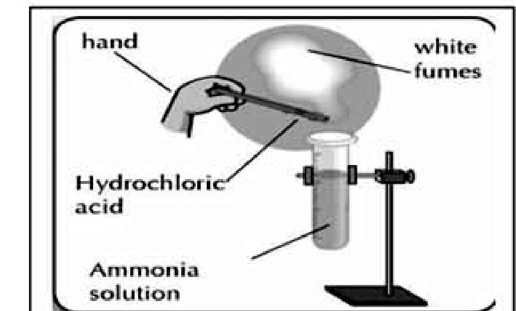
The paper will go away from the cup, while the coin falls inside the cup.

Conclusion:

Force of inertia makes objects resists change of its rest state.

Exp.❷

When you place a wetted glass rod with ammonia solution close to the mouth of a test tube containing concentrated hydrochloric acid.



Observation:

A white clouds evolve.

Conclusion:

$NH_3 + HCl \longrightarrow NH_4Cl$

(White clouds of ammonium Chloride)

Q.2 Classify the following salts into "dissolving" or not "dissolving" in water:

1. Silver Chloride (AgCl). ⟶ Insoluble
2. Sodium chloride (NaCl). ⟶ Soluble.
3. Magnesium Carbonate (MgCO3). ⟶ Soluble.
4. Lead Sulphate (PbSO4). ⟶ Insoluble.

Q.3 Identify the following rock specimen:

1. Granite.
2. Basalt.
3. Limestone.
4. Marble.

Best Wishes

